TURNER ON THE PLACENTA

Lectures on the Comparative Anatomy of the Placenta. First Series. By Wm. Turner, M.B. Lond. Pp. 122, Woodcuts, and Three Coloured Plates. (Edinburgh: A. and C. Black, 1876.)

THE anatomy of the Placenta has been studied by the best anatomists from Fabricius and Harvey to Hunter, Von Baer, and Sharpey; but much remained to be done when Prof. Turner took up the investigation; and those who are acquainted with his admirable memoirs, which lie hidden in the Transactions of the Royal Society of Edinburgh, know how much he has done to correct and extend our knowledge. The present volume contains a series of lectures delivered before the Royal College of Surgeons last year, and illustrated by specimens from their magnificent Hunterian museum, as well as from that of the University of Edinburgh. Prof. Turner has also been liberally aided by Dr. Sharpey, Mr. Huxley, and other anatomists with material, so that he is able not only to compare the placenta in man with that in the cat, bitch, cow, sheep, and mare, but also in the hyrax, elephant, seal, giraffe, alpaca, lemur, sloth, grampus, and narwhal. The present volume deals only with the diffuse, cotyledonous, and zonary forms of placenta; a second series of lectures will complete the subject by a similar discussion of the discoid placenta, and we shall then have the most complete monograph on this important structure which has yet appeared.

Prof. Turner begins with a short introductory account of the mucous membrane of the unimpregnated uterus, and especially of its glands, and of the chorion and other fœtal membranes. In describing the amnion, he gives the best account yet published of the curious brown or yellow appendages of this membrane found in various forms and in different species by Bernard, Owen, Rolleston, and others, which are probably identical with the "hippomanes" of veterinary surgeons.

The structure of the diffuse placenta in *Sus*, *Equus*, *Orca*, and other genera is then described. The villi of the chorion do not fit into the orifices of uterine glands, but into inter-glandular crypts, which do not exist in the unimpregnated uterus, and only appear as gestation advances. In Cetacea, as in the pig and mare, the villi do not persist over the whole chorion, but die off from the two poles, having only a certain amount of vascular tissue to represent the mesoblast of the allantois. But in the mare and the grampus there is also a third bare spot which corresponds with the os uteri, and is unrepresented in the pig. In the latter there are numerous bare spots scattered over the chorion, which were described by Von Baer and are now found by the author to correspond to parts of the uterine mucosa without crypts, and sparingly supplied with vessels. Dr. Turner has had the opportunity of dissecting two pregnant Lemurs (*Propithecus diadema* and *Lemur rufipes*), and finds that the form of the placenta in the former species is what M. Alphonse Milne-Edwards described as bell-shaped (*placenta en cloche*), *i.e.* the villi cover the whole chorion except at the os uteri; but in the Red-footed Lemur there are two other bare spaces at the poles of the ovum, so that the placenta *en cloche* is a mere generic, or accidental, variety of the diffuse form. Moreover, the villi came away from the crypts of the uterine mucosa in which they lay, without taking any maternal tissue with them. Thus the placenta of lemurs is neither discoid nor deciduate, and one more link of connection between this group and the true Primates is broken.

In his account of the placenta of the cow, Dr. Turner confirms the description by Von Baer and Weber, of the small pouches scattered over the chorion between the cotyledons, and is disposed to agree with the latter anatomist that they serve as receptacles for the secretion of the uterine glands during pregnancy. Similar "pocket-like" depressions were discovered by the author in the giraffe's placenta which was described by Owen in 1842. In this animal, as in the red deer, the cotyledons are arranged in longitudinal rows, and between them are not only much smaller tufts, but also short club-shaped villi, scattered separately or in minute groups over the chorion, which thus approximates to the diffuse form found in the camels and the chevrotains.

In the account of the deciduate placenta, the most important fact established by Prof. Turner is that there are several degrees in the amount of maternal tissue which is detached in parturition. If the ovum is stripped off the pregnant uterus of a cat, it carries with it the whole of the mucosa (decidua serotina) with which the chorion is in contact; but on careful examination of the placenta after its natural detachment at birth, it is found that a considerable amount of the vascular corium has been left behind, and that only the superficial part with the epithelial layer has come away with the chorion. In the bitch, as was pointed out by Prof. Rolleston in 1863, the placenta is still less "deciduate," for there is not enough mucosa detached with the ovum to form a continuous layer on the uterine surface of the placenta. Dr. Turner found that the placenta of a vixen agreed precisely with that of the bitch in this respect; the foldings of the uterine mucosa were so minute as to produce a reticulated structure of the placenta, and a similar arrangement was discovered in a specimen from *Halichoerus gryphus*. A re-examination of the placenta of the hyrax described by Prof. Huxley confirms his account of it, and contradicts the assertion of two French anatomists that it is non-deciduate. The poles of the chorion in the Carnivora are often well-supplied with blood-vessels, though no trace of villi can be found at full term beyond the equatorial region. In the otter and the weasel bare gaps occur in the placental zone, as described by Bischoff in 1865.

The most important points established by Prof. Turner seem to be the following:—

1. That the uterine glands are all compound and tubular, and cannot be divided into two groups, as they were by Sharpey, confirmed by most German anatomists. In this Dr. Turner agrees with Prof. Ercolani, of Bologna.

2. That the uterine glands do not open into the funnel-shaped crypts which receive the fœtal villi, but on the surface between them, and that the crypts are only developed during the progress of gestation. Here also the observations of Ercolani and of Eschricht are supported.

3. That the deciduate character is one of degree. The detached diffuse placenta consists entirely of fœtal structures; in the sheep and cow a large amount of maternal epithelium lining the walls of the uterine crypts comes off

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with the ovum, and possibly some of the vascular corium in addition; and even in *Canidæ* and *Pinnipedia* less of the decidua comes away at parturition than in the cat.

4. That the secretion of the uterine glands is absorbed by the intervillous parts of the chorion, and serves as "uterine milk or chyle," the comparison originally made by Harvey.

The important bearing of these researches on the classification of Mammalia is obvious, and they suggest scarcely less important questions as to the nutrition and respiration of the fœtus. P. S.

OUR BOOK SHELF

An Elementary Treatise on Kinematics and Kinetics. By E. T. Gross, M.A., Fellow of Gonville and Caius College, Cambridge, &c. (London: Rivingtons, 1876.)

MR. GROSS says, in his preface to the book before us, that it "is intended to contain as much as is required, under the head of Dynamics, of candidates for honours in the first three days of the mathematical tripos." This object has no doubt determined to a great extent the form which the work has taken, and we see no reason to doubt that it is well suited for the purpose mentioned, and will prove useful to students working for Cambridge examinations. The first five chapters are devoted to the Kinematics of a point, the conception of Velocity being taken up at the outset, along with that of Motion; motion as change of position, and the theorem of the instantaneous centre is only briefly mentioned in a short chapter (the sixth) chiefly devoted to the "Geometry of the Cycloid." The remaining ten chapters of the book are given to Kinetics. The author has taken great pains to put the fundamental conceptions of his subject clearly before his readers, and the parts of his book most valuable to the general student will certainly be those in which he endeavours to crystallise the vague notions too often picked up, at the commencement of a study, as to velocity, force, &c. At the same time we must say that the arrangement of the book is not such as to fit it for general purposes as an elementary text-book on its own subjects. Perhaps this was unavoidable, considering the main object with which it was written, but it is certainly to be regretted. For most purposes it seems better to commence the study of Kinematics by considering motion as change of position only, leaving velocity to be brought in later. This certainly makes it more easy for the student to realise the matter, and obviates such difficulties as occur for instance at pp. 16 and 20, where "change of velocity" means in one place a change of velocity both in direction and in magnitude, and in the other a change in magnitude only. The same treatment also would allow of portions of the Kinematics of rigid bodies being taken up in an elementary manner, while in Mr. Gross's work this part of the subject, the most important one, is practically left untouched. No motion, in fact, is considered, except the motion of a point in a plane. The treatment by the method of instantaneous centres is merely mentioned, although the development of this method certainly furnishes excellent means for the elementary treatment of the more important problems connected with the kinematics of rigid bodies. Similar remarks might be made in reference to the second part of the work, but perhaps it is not fair to criticise from this general point of view a book written chiefly for a special and limited purpose.

Mr. Gross has used geometric illustrations freely and with great advantage throughout his book. We regret that he has adhered throughout to the *parallelogram* of velocities, forces, &c. Surely it is more elegant and in every way better to use three lines than five. Culmann's science can be very little known in this country if we have not yet got even as far as this.

LETTERS TO THE EDITOR

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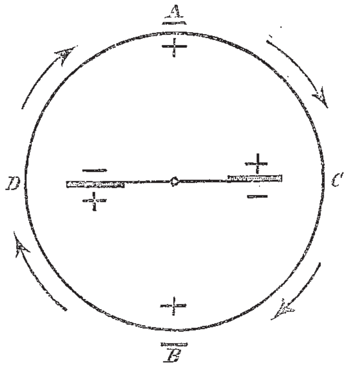
The Direct Motion in the Radiometer an Effect of Electricity

I HASTEN to communicate to NATURE some new facts which are destined, I believe, to throw some light on the theory of the radiometer:—

1. The glass globe becomes negatively electrified upon the whole of its exterior when the instrument is submitted to solar, or even obscure heat radiations of sufficient intensity, and this electricity is more intense upon the hemisphere facing the radiant source than that opposed. It was by means of a proof-plane of large surface and a Bohnenberger's electroscope that I was able to determine the presence of this free electricity. By touching the globe several times in different places with the proof-plane, and then applying it to the electroscope, the effects are very sensible. This electricity cannot be attributed to the friction of the radiometer vanes with the rarefied air of the globe, since the electroscopic indications are not modified when the instrument is inverted, and the vanes thus prevented from moving. Neither, as several experiments show, can it be attributed to feeble evaporation on the exterior. This development of electricity upon the exterior surface of the globe is of course necessarily accompanied by the development of positive electricity upon the inner surface.

2. When exposed to radiation, the black face of the vanes is electrified positively, and the bright face negatively. This I have proved in the following manner:—I took a strip of mica two decimetres long, and having coated one of the sides with lampblack, I suspended it in a Coulomb's Torsion Balance, having previously electrified the metallic disc of the balance-needle with positive electricity. The blackened side faced the disc. I then allowed the radiations from a gas-flame to fall upon the blackened surface of the mica strip. Notwithstanding the light was at some distance, and had to penetrate the thick glass shade inclosing the balance, the needle was rapidly repelled several degrees, showing that the blackened face was positively electrified under the influence of radiation. I then turned the strip of mica so that the bright side faced the disc and allowed the radiation to fall as before upon the blackened surface. The needle indicated an attraction between the disc and the mica, proving that the bright surface was negatively electrified.



3. To anticipate the objection that these electrical manifestations are too feeble to account for the rapid revolution of the vanes, I gently rubbed the globe with a brush composed of glass threads; the electricity developed on the globe acting by induction upon the nearest mica disc of the radiometer caused a brisk oscillation. I then measured the intensity of this electricity by means of the proof-plane and electroscope, and there were no indications of greater intensity then when the globe was electrified by radiation.

4. From the above facts the following theory, if I mistake not, necessarily flows. The radiometer is electrified as represented in the figure. At C the black face of the vane is turned towards the radiant source, and in this position the vane will be forced to move in the direction A C B; when it arrives at D, the direction of the rotation which the attractive and repulsive forces

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